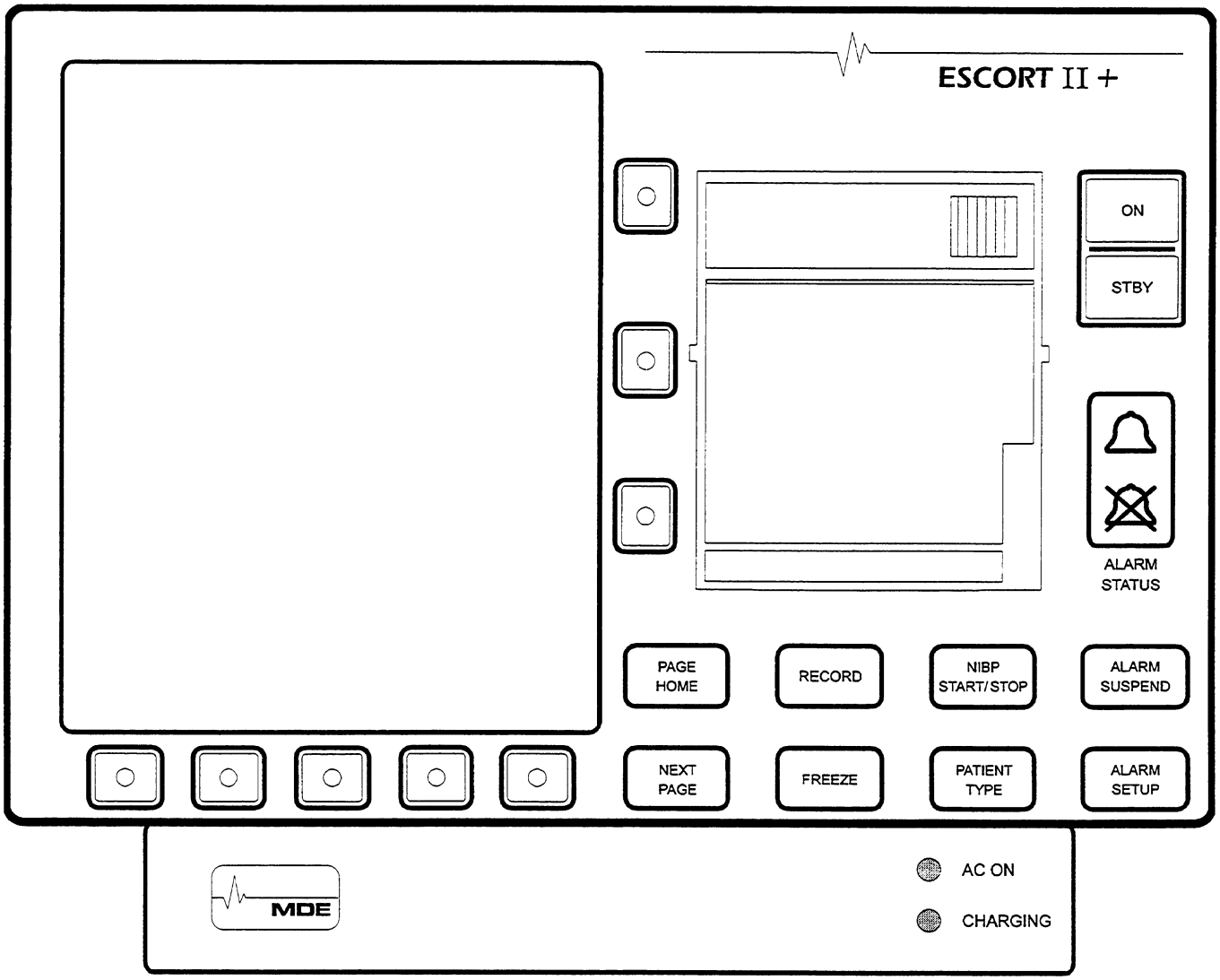
ESCORT® II+
MODEL 20101
3 TRACE PATIENT MONITOR
SERVICE MANUAL



MDE

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PATENT INFORMATION

MDE US Patents: 4,757,520; 4,922,918

Nellcor US Patents: 4,621,643; 4,830,014; 4,700,708; 4,770,179; 4,869,254; 4,685,464; 4,802,486

STANDARD WARRANTY

The ESCORT II+ 20101 Monitor is warranted against defects in materials and workmanship for a period of twelve (12) months from the date of shipment to the original purchaser. Batteries, cables, cuffs, and sensors are warranted ninety (90) days from date of shipment. Warranty is valid only to the original buyer. Defective equipment should be returned freight prepaid to Medical Data Electronics. Equipment returned with defective parts and assemblies will be either repaired or replaced. This warranty is not applicable if repair has been attempted, if the instrument has been damaged due to operation outside the environmental and power specifications for the product, or due to improper handling or use.

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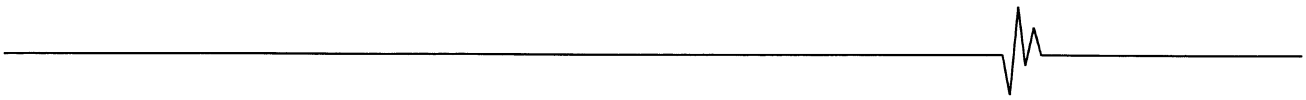


1 Introduction

1 INTRODUCTION

1.1 General Description

The ***ESCORT II+*** monitor is a modular patient monitor capable of keeping track of as many as nine (9) parameters simultaneously, including dual vector ECG, Respiration, SpO_2, Noninvasive Blood Pressure, one or two Invasive Blood Pressures, Temperature, Mainstream/Sidestream $ETCO_2$, and Cardiac Output. The ***ESCORT II+*** monitor features several modular components that are interchangeable with other ***ESCORT II*** Series modular monitors.

The ***ESCORT II+*** monitor has a high-resolution, 7" CRT display screen, capable of displaying as many as three waveform traces simultaneously. This large CRT display accurately reproduces physiological waveform abnormalities, providing the detail needed to make clinical decisions.

The ***ESCORT II+*** monitor is equipped with AC, battery (optional), and external DC power capability. Optional battery operation is provided by three modular batteries, with operating time ranging from 1.75 to 2.5 hours, depending upon configuration.

The ***ESCORT II+*** can monitor adult, pediatric, and neonatal patients. The appropriate monitoring mode for each patient, ADULT, PED, or NEO, is selectable using the *Patient Type* key located on the front panel. Changing from one mode to another automatically changes all appropriate algorithms, alarm limits, and any applicable parameter defaults.

The ***ESCORT II+*** monitor minimizes the number of function keys at any given time. Some keys, fixed function keys, are labeled on the front panel and always retain the same function. Other keys, softkeys, are not labeled and vary in function according to the labels displayed adjacent to them on the monitor's screen. There are eight softkeys, five located at the bottom of the front panel, and three located on the right side of the front panel. For more information on the monitor keys and their functions, see Chapter 2, "Controls & Indicators."

Factory defaults have been established and installed for all system and physiological monitoring issues (i.e., alarm settings, default ECG lead, etc.). These values may be easily reconfigured to meet specific needs.

This service manual provides readily available documentation to troubleshoot, repair, and maintain the ***ESCORT II+*** monitor. It outlines functional block diagrams, board layouts, schematic diagrams, and parts listings for each of the hardware modules of the ***ESCORT II+*** for use by technical service personnel. Also included is a performance check section, as well as a section on care and cleaning. Following these procedures will help to keep your ***ESCORT II+*** monitor(s) working efficiently and reliably for many years to come.

1.2 System Configuration & Options

The vital sign parameters for the ESCORT II+ monitor are factory configured in a Multiparameter Module. The Multiparameter Module is removable, allowing the user to move it from one monitor to another as necessary. The Multiparameter Module includes dual vector ECG and can be equipped with as many as nine parameters.

The ESCORT II+ monitor can be equipped with several additional options, including a bedside recorder module and a wireless central station transceiver module. Table 1-1 lists all the available options.

Table 1-1: ESCORT II+ Options

Model Number	Description
20101	**ESCORT II+ Modular Patient Monitor with High Resolution, 7", 3-Trace CRT Display**
Option 15B	Modular Batteries
Option 37	Add Graphic Trends
20001	**Multiparameter Module (includes dual vector ECG)**
Option 27	Add Respiration
Option 28	Add Noninvasive Blood Pressure
Option 29	Add Noninvasive Blood Pressure and Temperature
Option 30	Add SpO2
Option 31	Add Invasive Blood Pressure
Option 32	Add Invasive Blood Pressure and Temperature
Option 33	Add (2) Invasive Blood Pressures
Option 34	Add (2) Invasive Blood Pressures and Temperature
Option 35	Add Temperature
Option 36	Add ETCO2 (Note: Requires Model 20020 or Model 20021 ETCO2 sensor, sold separately)
Option 38	Add Hewlett-Packard Merlin ECG & Invasive Blood Pressure Connectors
Option 39	Add Cardiac Output
20002	**Multichannel Thermal Array Recorder Module**
20011	**E3200B LINK Transceiver Module**
20012	**UHF Telemetry Receiver Module 430 - 470 MHz**
1200LR-01	**Single Vector UHF Long Range Transmitter 450 - 470 MHz**
20013	**Dual Vector UHF Long Range Transmitter 450 - 470 MHz**
20014	**Dual Vector UHF Long Range Transmitter 430 - 450 MHz**
20015	**E3200A UHF LINK Transceiver Module**
20018	**Serial I/O Module**
20020	**Mainstream ETCO2 Sensor**
20021	**Sidestream ETCO2 Sensor**
20025	**Programmable Remote Display**

1.3 Safety Considerations

Read the following sections before using the ESCORT II+ monitor. Several warnings are presented to both increase patient safety and prevent damage to the monitor. Rear panel symbols are displayed and defined in section 1.3.2.

1.3.1 Warnings

Warnings are included throughout the manual. All warnings are presented in the following format.

WARNING: Read this service manual in its entirety prior to attempting any service or repair.

WARNING: ONLY qualified technicians possessing specific experience and expertise in the servicing of biomedical equipment should attempt servicing the ESCORT II+ monitor.

WARNING: HIGH VOLTAGES are present within the ESCORT II+ monitor. Use caution when servicing.

WARNING: Always use an ESD (Electro-Static Discharge) grounding wrist or ankle strap that is properly grounded. Always perform service in an ESD safe environment.

WARNING: The ESCORT II+ is intended only as an adjunct in patient assessment. It cannot replace skilled nursing care and proper surveillance. Keep high risk patients under close surveillance.

WARNING: Carefully read the ESCORT II+ Operator's Manual, all directions for use of monitor accessories, and all precautionary information before attempting clinical use of the ESCORT II+.

WARNING: When operating the ESCORT II+ from an AC power source, the wall receptacle must be a three-wire, grounded, hospital grade outlet. Use only ESCORT II+'s original hospital grade AC power plug and cord, or an equivalent hospital grade plug and cord. If in doubt about the integrity of the grounding of the main supply connection, the unit must be operated by battery power.

WARNING: DO NOT plug unit into multiple outlet power strip to avoid summation of leakage currents.

WARNING: Explosion hazard. Do not use the ESCORT II+ in the presence of flammable anesthetics.

WARNING: In the event of an adverse patient condition, the audio alarm will not sound if it has been temporarily silenced or disabled.

WARNING: For pacemaker patients, the HR may continue to count the pacemaker artifact during cardiac arrest or other arrhythmias. Keep pacemaker patients under close surveillance.

WARNING: Do not use in ambient temperatures above 40° C or below 5° C.

WARNING: For protection against fire, replace fuses only with those of the same type and rating.

WARNING: The alarms for some parameters are factory set to default to the OFF setting. This may not be consistent with the policies of your institution or the type of patients being monitored by the ESCORT II+ monitors.

1.3.2 Symbols

The following are cautionary symbols that appear on the ESCORT II+ monitor and their definitions. You should familiarize yourself with these symbols and their meaning before using the ESCORT II+ monitor.

Type CF Defibrillation Protected Equipment: Isolated patient connections comply with the allowable leakage current limits for direct cardiac application and are protected against the effects of defibrillation.

Attention: Consult accompanying documents.

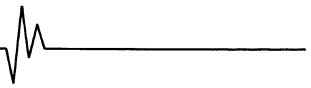
Replace Fuses as Marked: For protection against fire, replace only with fuses of the same type and rating.

Caution: Dangerous voltage.

Alternating Current: 115 V @ 60 Hz, or 220-240 V @ 50 Hz.

Equipotential Connection: When external DC power is used, the equipotential connection must be used as a protective ground terminal.

Fuse: Voltage and current ratings appear adjacent to symbol.

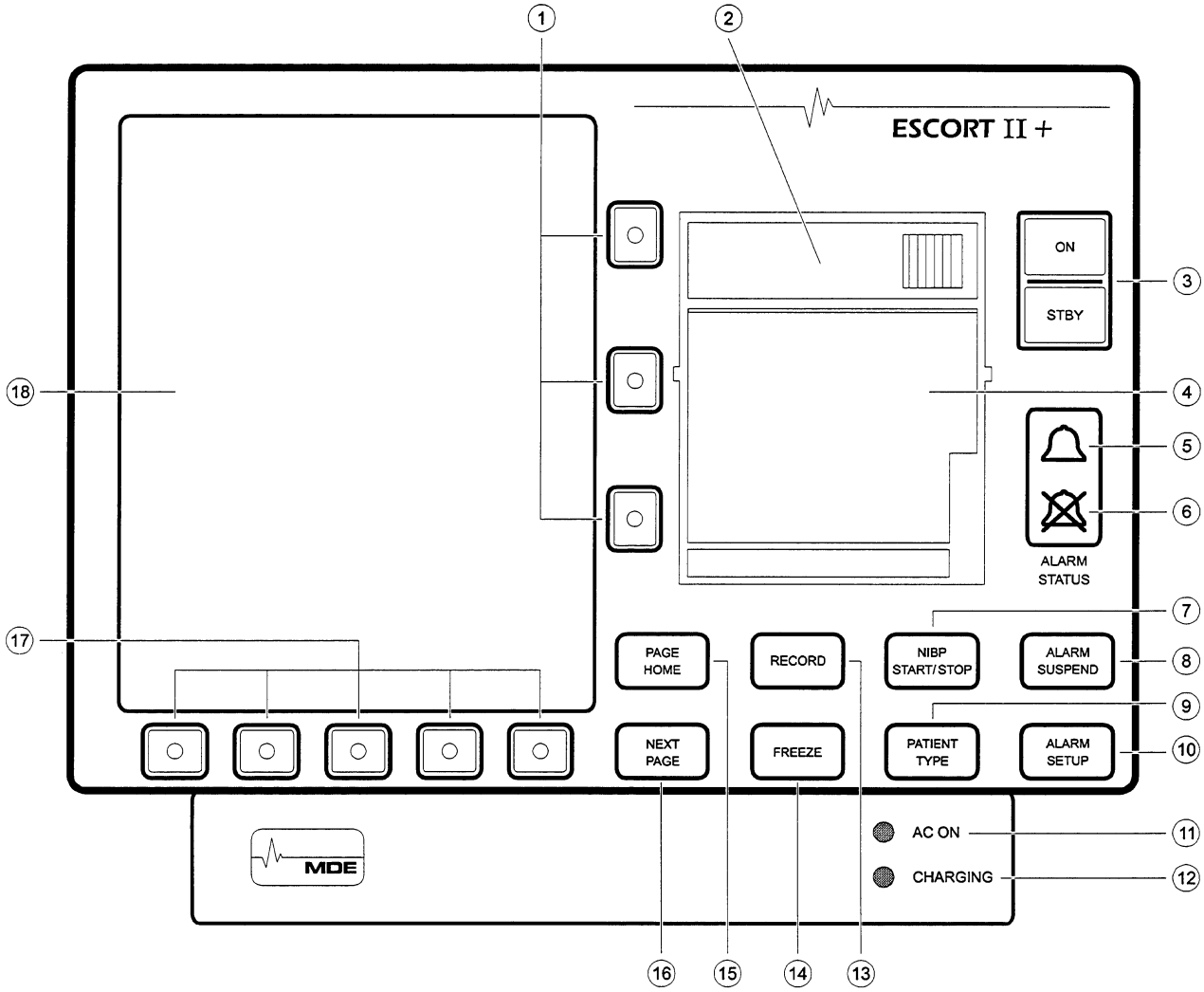


2 Controls and Indicators

2 CONTROLS and INDICATORS

2.1 Front Panel

A summary of the ESCORT II+ front panel keys and indicators is provided in the figure below and on the following pages. Fixed functions keys, softkeys, and indicators are each discussed individually.



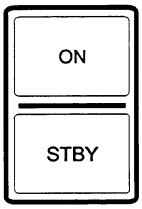
1. Parameter Softkeys
2. Recorder Door Release
3. Monitor On/Standby Keys
4. Multichannel Thermal Recorder
5. Alarm Indicator (Active Alarm)
6. Alarm Indicator (All Alarms Disabled or Silenced)
7. Start/Stop an NIBP Reading
8. Temporary Alarm Suspend
9. Patient Type Selection (Adult/Ped/Neo)
10. Alarm Setup Key
11. AC Power Indicator
12. Battery Charging Indicator
13. Start/Stop Manual Recordings
14. Freeze/Unfreeze All Waveform Traces
15. Return to Home Page
16. Display Next Page of Softkey Menus
17. Parameter/System Softkeys
18. 7-inch, High Resolution CRT Display

Figure 2-1: ESCORT II+ Front Panel Detail

Fixed Function Keys

The ESCORT II+ includes the following seven (7) fixed functions keys: ON/STBY, ALARM SUSPEND, ALARM SET UP, PAGE HOME, NEXT PAGE, RECORD, FREEZE, PATIENT TYPE, and NIBP START/STOP. Each of these keys, as the name implies, is fixed and performs its intended function regardless of the monitoring scenario. A brief description of each is provided below.

ON/STBY



Turns the display on and initializes the ESCORT II+ when ON is pressed. The ESCORT II+ is returned to standby status by pressing STBY. When in STBY, the batteries continue to be charged if the ESCORT II+ is connected to AC power, but no monitoring or storing of data occurs.

ALARM SUSPEND

Temporarily suspends alarm tones. The factory defaults for alarm suspend intervals are 180 seconds in adult mode, 90 seconds in pediatric mode, and 60 seconds in neonatal mode. If an alarm limit is violated, pressing ALARM SUSPEND will silence the alarm tone. Pressing the key again before the suspend time period has elapsed will reactivate the audible alarm tones if the alarm condition still exists. While alarms are suspended, the following message will appear on the ESCORT II+ screen:

ALARM SUSPEND *XXX*

The ***XXX*** will be replaced with the number of seconds remaining until the alarm suspend condition is removed.

ALARM SETUP

Displays the alarm status for all vital sign parameters. Alarm ON/OFF status, high and low limits, and recording type for each active parameter are displayed. A 🔔 to the right of the listed parameter indicates that one or more alarms for that parameter is ON. An X is displayed when all alarms for the associated parameter are OFF.

PAGE HOME

Returns the ESCORT II+ display to the HOME PAGE screen (i.e., the screen normally displayed during patient monitoring).

NEXT PAGE

Scrolls through softkey options. Up to five selections may be displayed at the bottom of the ESCORT II+ screen just above a row of five softkeys. To access additional softkey selections, press the NEXT PAGE key.

RECORD

Initiates a 16-second recording of any one or two parameter waveforms. To stop a recording in process, press RECORD prior to completion of a manual or alarm recording. To specify the parameters to be recorded, press the softkey(s) of the desired parameter(s) within two seconds after pressing the RECORD key. If no parameters are selected after pressing record, a 16-second strip of ECG waveform will be recorded.

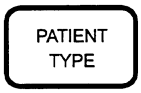
Note: ***Active waveforms (i.e., parameters currently being monitored) do not need to be displayed in order to acquire a recorded waveform.***

FREEZE

Freezes all displayed waveforms for evaluation purposes. Pressing FREEZE again releases waveforms.

Note: ***Waveforms cannot be frozen during recording. Initiating a recording will also release the frozen waveforms.***

PATIENT TYPE



Provides one-touch access for changing the current patient monitoring mode (i.e., ADULT, PED, or NEO).

NIBP START/STOP

Provides one-touch initiation and cessation of an NIBP measurement.

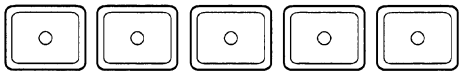
Softkeys

The ESCORT II+ monitor is equipped with eight (8) softkeys. Softkey operation changes depending upon the monitoring mode, parameter, or configuration options being accessed. Three parameter softkeys are located to the right of the display screen. Five parameter/system softkeys are located below the display screen.

PARAMETER SOFTKEYS

These three softkeys, located on the right side of the front panel, provide access to the function keys of the parameters displayed in the waveform display zone. ECG is always assigned to the top waveform trace, and as many as two additional parameters, when available (i.e., installed), can be assigned to trace 2 and trace 3.

PARAMETER/SYSTEM SOFTKEYS



The function of these five softkeys, located directly below the display screen, depends on the label or function key displayed directly above the softkey. In the HOME PAGE state, parameter labels and associated numeric values may be displayed directly above one or more of the softkeys. To access the function keys for any of these parameters, press the softkey under the parameter label and a page of function keys that relates specifically to that parameter will be displayed.

Indicators

The ESCORT II+ includes up to four indicators which illuminate to notify the operator of a specific activity or situation. Two of the indicators, AC ON and CHARGING are only present when the ESCORT II+ battery option is included with the monitor. The ALARM indicators are present on all ESCORT II+ monitors.

ALARM INDICATOR (ACTIVE ALARM)

The red Alarm Bell illuminates and flashes when a parameter alarm limit is violated. The light stops flashing when the alarm violation is corrected, or when the operator turns the alarm off. The ALARM Indicator will continue to flash when the ALARM SUSPEND key has been pressed and the alarm violation is still present.

ALARM INDICATOR (ALL ALARMS DISABLED)

The orange Alarm Bell with an X through it indicates that either all alarms are turned OFF or that all alarms are have been suspended using the ALARM SUSPEND key.

AC ON INDICATOR ● AC ON

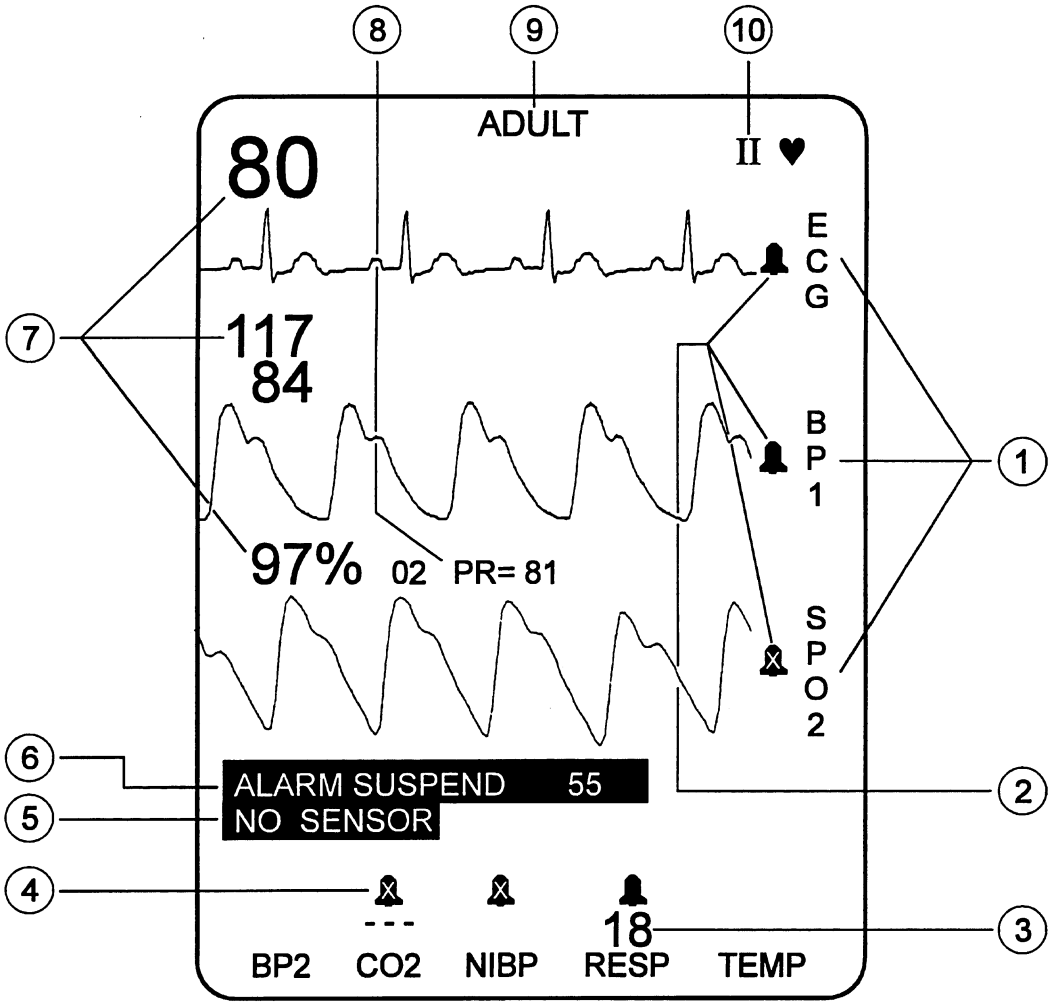
The green AC ON LED illuminates when the ESCORT II+ is connected to AC power.

BATTERY CHARGING INDICATOR ● CHARGING

The yellow CHARGING LED illuminates when the ESCORT II+'s optional batteries are charging. The CHARGING LED will not be illuminated when the batteries are fully charged, or when the monitor is not connected to AC power.

2.2 Display Screen

The following is a brief description of the information and format presented on the ESCORT II+ display screen.



1. Softkey Labels for Parameters Displayed in the Waveform Display Zone (WDZ)
2. Alarm Status for Parameters in the WDZ
3. Numeric-Only Display Zone (NODZ)
4. Alarm Status for Parameters in the NODZ
5. Message Line for Parameters in the NODZ
6. System Message Line
7. WDZ with Associated Numerics
8. Message Line for Parameters in the WDZ
9. Current Monitoring Mode
10. ECG Lead in Use

Figure 2-2: ESCORT II+ Display Screen

Softkey Labels for Parameters Displayed in the Waveform Display Zone (WDZ)

The labels displayed adjacent to the parameter softkeys specify the parameters displayed in the WDZ.

Alarm Status for Parameters in the Waveform Display Zone

Each bell displayed in the WDZ indicates the alarm ON/OFF status for the parameter adjacent to it.

If a solid bell is displayed, one or more alarm for the associated parameter is ON.

If the bell is displayed with an X through it, the alarms for the associated parameter are OFF.

Numeric-Only Display Zone (NODZ)

The parameter labels displayed above the softkeys at the bottom of the front panel specify the parameters associated with each softkey. The numeric data associated with the parameters are displayed above the parameter labels in the Numeric-Only Display Zone.

Note: ***In the HOME PAGE state, the parameter labels and numeric data are displayed directly above the softkeys. When a parameter or system setup page is displayed above the softkeys, the Numeric-Only parameter labels and associated data are displayed slightly above the setup page.***

Alarm Status for Parameters in the NODZ

Each bell displayed in the Numeric-Only Display Zone indicates the alarm ON/OFF status for the parameter listed below it.

If a solid bell is displayed, one or more alarm for the associated parameter is ON.

If the bell is displayed with an X through it, the alarms for the associated parameter are OFF.

Message Line for Parameters in the NODZ

Messages concerning parameters in the NODZ will be displayed in a reverse-video box on the left side of the screen, just above the NODZ. Message display is temporarily obscured when a parameter or system setup page is displayed. In the HOME PAGE state, the message continues to be displayed as long as the message condition exists.

System Message Line

A message that is not specific to a single parameter, such as "ALARM SUSPEND 180," is displayed in a reverse-video box on the left side of the screen, just below the WDZ. Message display is temporarily obscured when a parameter or system setup page is displayed. In the HOME PAGE state, the message continues to be displayed as long as the message condition exists.

Waveform Display Zone with Associated Numerics

The Waveform Display Zone displays waveform traces and associated numeric data for as many as three different parameters. The top waveform trace is reserved for the ECG waveform; however, you can assign different parameters to the other two waveform traces.

Message Line for Parameters in the WDZ

Messages concerning parameters displayed in the WDZ will be displayed in a reverse-video box to the right of the numeric data for the corresponding waveform parameters. The message is displayed as long as the message condition exists.

Current Monitoring Mode

The current monitoring mode is displayed at the top of the screen — ADULT, PED, or NEO. The monitoring mode can be changed by pressing the PATIENT TYPE key followed by selecting the appropriate mode.

ECG Lead in Use

Indicates the ECG lead displayed in the top trace of the WDZ. Choices include lead I, II, III, or V LD (for "chest lead" in a 5-lead configuration). If heart rate is being derived from SpO_2 or Invasive Blood Pressure instead of ECG, *PULSE* is displayed.

2.3 Side Panel

Figure 2-3 displays the right side of the ESCORT II+ monitor. The Multiparameter Module and the Recorder Module Release may each be accessed from this side of the monitor.

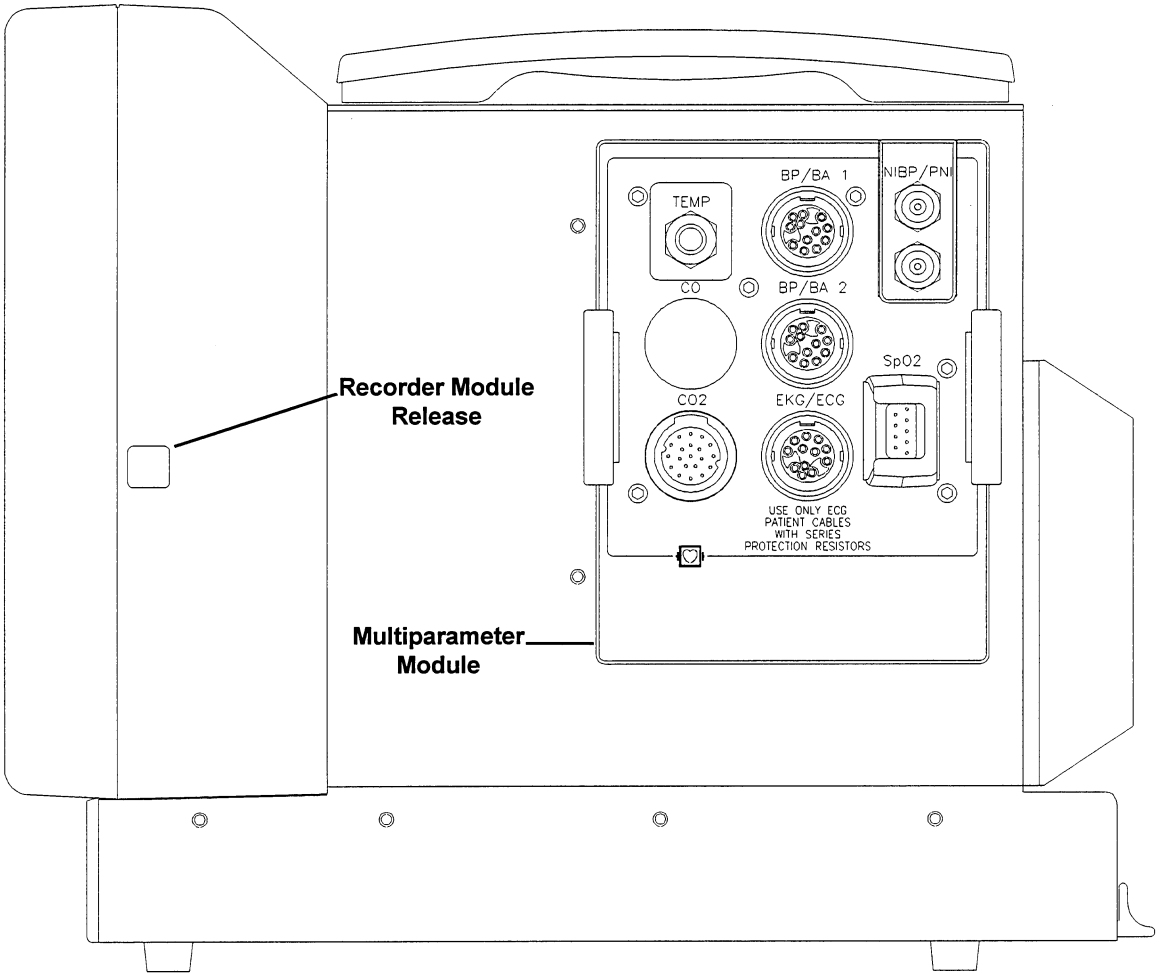


Figure 2-3: ESCORT II+ Side Panel

Multiparameter Module

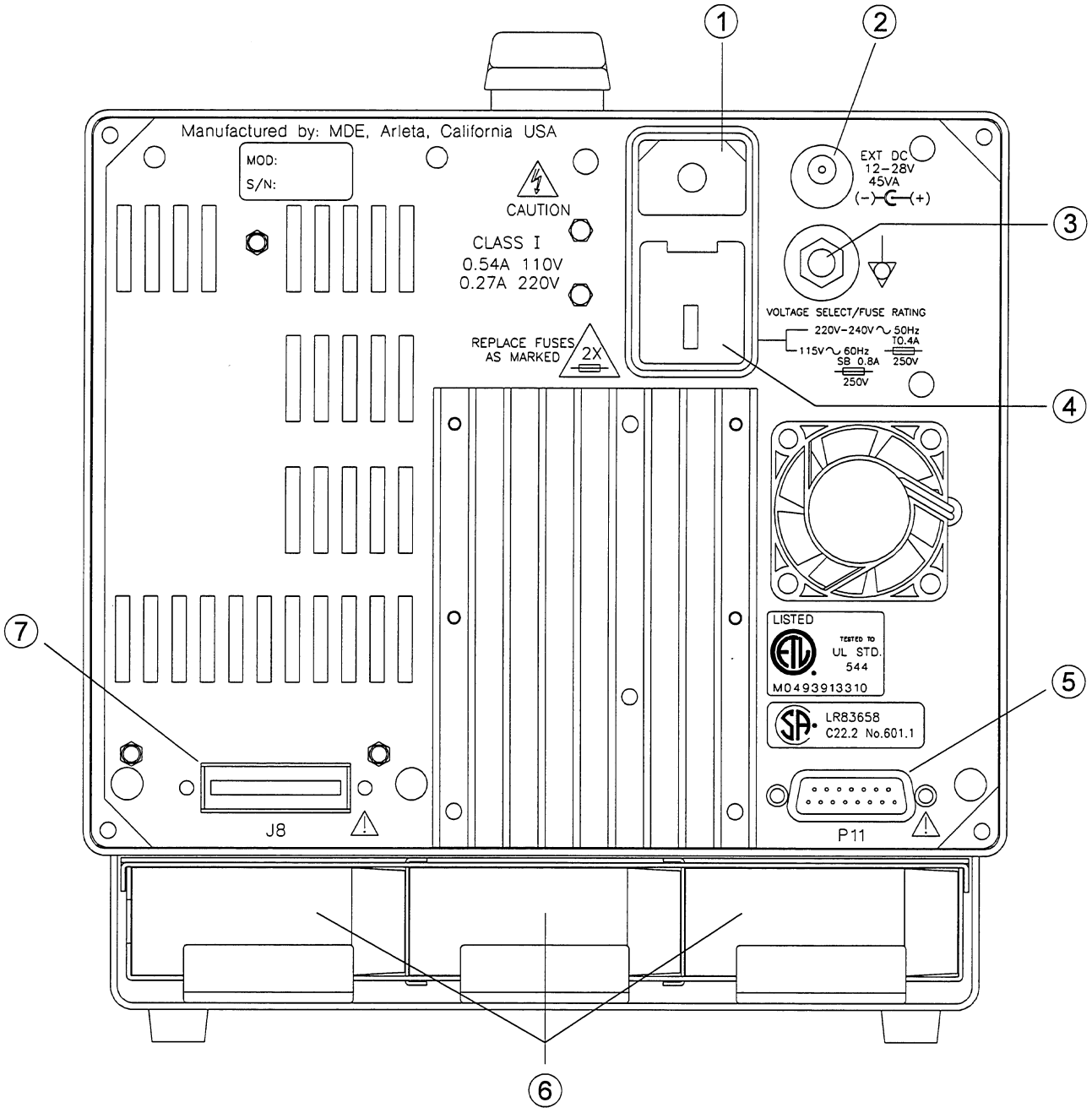
The module in Figure 2-3 is configured for several parameters; your Multiparameter Module may be configured for fewer parameters. This module may be interchanged with any ESCORT II monitor within your facility.

Recorder Module Release

Allows the Recorder module to be released from the ESCORT II+ housing by pushing the button while pulling the recorder out from the ESCORT II+.

2.4 Rear Panel

Figure 2-4 presents the ESCORT II+ rear panel. Brief descriptions are provided for the areas indicated.



1. AC Power Cord Input Connector
2. External DC Input Connector
3. Equipotential Connector
4. Fuse Holder/Voltage Selector
5. Auxiliary Output Connector
6. Batteries/Battery Housing (Option 15)
7. Transceiver/Telemetry Connector

Figure 2-4: ESCORT II+ Rear Panel

AC Power Cord Input Connector and Optional Power Cord Mounting Bracket

Allows connection of the AC power cord to the monitor. In addition, the AC power cord must be plugged into an AC source before the monitor can operate on AC power and before the batteries can be charged.

For permanent connection, the MDE power cord bracket should be installed. See Figure 2-5 for instructions on installing the power cord mounting bracket.

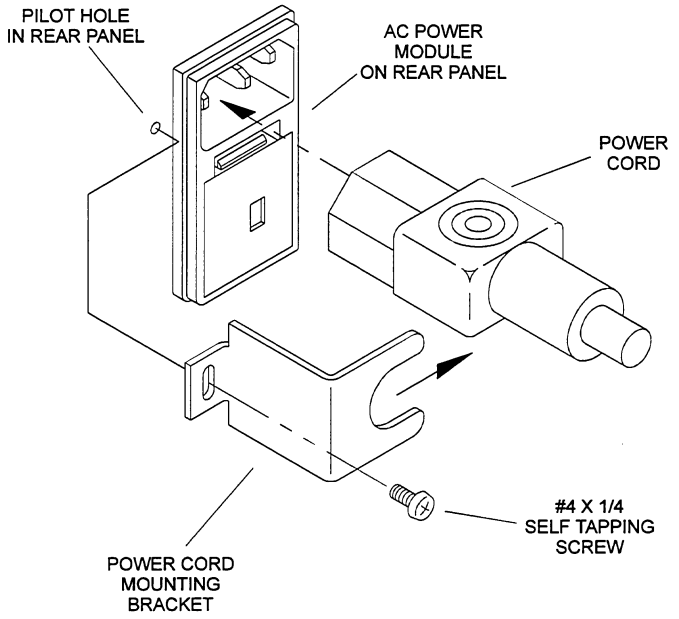


Figure 2-5: AC Power Cord Bracket Installation

External DC Input (12 - 28V) Connector

Allows an external DC power source to be connected for extended use during transport where AC power is not available.

Equipotential Connector

Provides grounding for the monitor when the monitor is used with other medical equipment. It must be used as a protective ground terminal when the monitor is operated with external DC power.

Fuse Holder/Voltage Selector and Fuse Replacement

The fuse holder contains the fuses and the voltage selector for the monitor. Open the door of this holder to replace fuses or to configure the voltage selection block — 115 VAC or 230 VAC. The present voltage setting can be read through the small rectangular window on the door of the holder. It is recommended that qualified technical service personnel replace fuses or change the voltage selection when necessary.

> **WARNING: For protection against fire, replace fuse only with one of the same type and rating.**

The ESCORT II 20101 requires two identical slow blow 0.8A fuses for 115 VAC operation, or two 0.4A fuses for 230 VAC operation. Ensure that the AC power cord has been disconnected before replacing fuses. Carefully open the door of the fuse holder with a short 1/8" flat screwdriver. Replace the blown or defective fuse with one of the same type and rating. Noting orientation, gently slide the fuse holder back until it locks snugly into its original place. After the fuse replacement, connect the AC power cord to the ESCORT II+. The unit is now ready for operation.

Auxiliary Output Connector

Provides analog waveform or alarm relay closure interface signals from the ESCORT II+ to other clinical instruments.

> **WARNING: When connecting the ESCORT II+ to any other instrument, verify proper operation before clinical use. Refer to the other instrument's operation manual for complete instructions.**

Batteries/Battery Housing

These three slots contain modular batteries which are optionally available with the monitor.

Transceiver/Telemetry Connector

If a transceiver module is connected here, wireless communications between the monitor and the ESCORT-LINK Central Station can be established.

If a telemetry receiver module is connected, communication between the monitor and an ambulatory transmitter can be established.

2.5 Power Sources

Determine Power Source

> **WARNING: Always locate the ESCORT II+ and its power cord away from any electrosurgery equipment and its power cord and cables.**

There are three options for providing power to the ESCORT II+ monitor: AC, battery, and external DC power. These options and their requirements are described below.

AC Power

> **WARNING: When operating the ESCORT II+ from an AC power source, the wall receptacle must be a three-wire, grounded, hospital grade outlet. Use only ESCORT II+'s original hospital grade AC power plug and cord, or an equivalent hospital grade plug and cord. If in doubt about the integrity of the grounding of the main supply connection, the unit must be operated by battery power.**

If the ESCORT II+ monitor is operated by AC power alone, make sure the following requirements are met:

1. The fuses and voltage selected in the fuse holder on the rear panel must be appropriate for the line power to which the monitor is connected — 115 VAC or 230 VAC (the present voltage setting can be read through the small rectangular window on the fuse holder door).

2. The ESCORT II+ monitor power cord is connected to both the monitor and a live power source.

Note: For permanent connection, the MDE power cord bracket should be installed.

If the above requirements are met, the AC ON LED should be illuminated. If the above requirements are met and the LED is not illuminated, technical service personnel should inspect the monitor and connection.

Battery Option

Power to the ESCORT II+ monitor may be supplied by utilizing the Battery Option (Option 15). The Battery Option transforms the ESCORT II+ into a fully functional, portable monitor available for use in various transport situations.

The batteries utilized in the ESCORT II+ Model 20101 monitor are 12 VDC sealed lead-acid type rated at 2.3 AH. Fully charged batteries should measure approximately 13.0 to 13.5 Volts DC with an open load.

The ESCORT II+ will indicate battery status on screen as BATTERY HI, MID, LOW or VERY LOW. Battery status may be viewed from the TEST page when SW STAT INFO is selected and the monitor is running on battery power.

To ensure proper installation of batteries, note the arrows on the battery label and install as indicated.

Battery charging circuitry is located on the Power Supply Board (P/N 401855-0000). See Chapter 3, "Power Supply Board," for details.

Note: ***Never discharge the batteries completely. To ensure long battery life, always recharge batteries immediately after use. An optional battery charger (MDE Part Number: E2700-12) is recommended. Batteries should be replaced every two (2) years regardless of test results. Used batteries should be recycled or disposed of properly.***

When included with the ESCORT II+, the Battery Option is attached to the bottom of the monitor and interfaces electrically with the ESCORT II+ via the Battery Interface Board.

The ESCORT II+ accommodates up to three (3) rechargeable sealed lead-acid batteries (MDE Part Number E2700-37). Figure 2-6 displays the Battery Option Assembly.

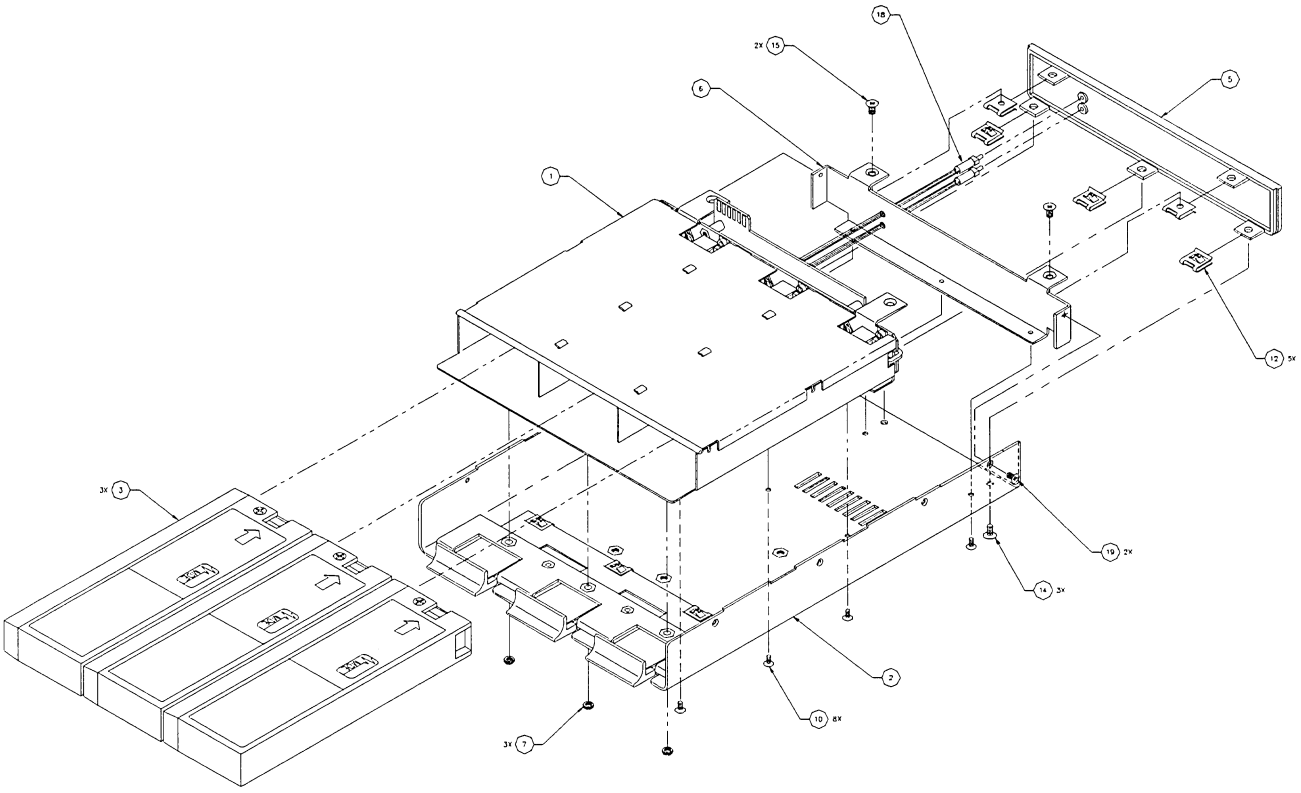


Figure 2-6: Battery Option Assembly

Table 2-1: Parts Listing, P/N 500387, Battery Option Assembly

MDE Part Number	Description	Quantity	Reference
358100-0012A	SCR, 4-40 X 3/16,PH PNHD ZINC	4	16
358100-0062A	SCR, 6-32 x 1/4, PHL.FLTHD. 100 DEG. S.S.	3	14
358100-0091A	SCR, 6-32 x 5/16 PHFLTHD PLTD 100 DEG	2	15
358100-0123A	SCR, 4-40 x 1/8"LG,82DEG,UNDERCUT SS	6	8
358100-0133A	SCR, TAPTITE,4 x 3/16"LG,100DEG,FLH PHL STL Zn PLT	8	10
358100-0154A	SCR, 2-56 x 3/16IN LG 82 DEG,FLHD,PH SS	2	13
358200-0007A	WSHR, #4 INT TOOTH	4	11
360500-0038A	NUT, #6-32,ELASTIC STOP,THIN PTTRN	3	7
360600-0062A	CLIP, U-TYPE 6-32,.06 THK PNL	5	12
401247-0000	E3 BATTERY PACK W/ LABEL ASSY REV. A	3	3
401761-0000	FAB** FRONT COVER PLATE E2B MOLDED REV E (E2124)	1	5
401762-0000	BATTERY SKIN MTG BRKT E2B REV D (E1855)	2	4
401961-0000	E2B SKIN ASSY. REV F (E1801)	1	17
401971-0000	E2B BATTERY SKIN ASSY. REV D (E1814)	2	19
402355-0000	FAB PAINT SCR #2-56X3/16"LG 82 DEG FLH REV B(E1748)	6	9
402708-0000	E2B PLUS BATTERY HOUSING ASSY REV. A(E2095)	1	1
402709-0000	E2B PLUS BATTERY SKIN ASSY REV. A(E2095)	1	2
402710-0000	STIFFENER, E2B PLUS BATTERY REV. A(E2095)	1	6
402721-0000	LED/CABLE ASSY E2B PLUS BATTERY OPT REV. A(E2095)	1	18

The following guidelines apply when operating the ESCORT II+ with battery power:

- Operating time with three fully charged batteries is 1.75 to 2.5 hours, depending upon monitor configuration.
- Use of the monitor's recorder will shorten battery operating time 5 minutes for every minute the recorder runs.
- Battery operating time will shorten 5 minutes for every minute that the NIBP pump runs.

- The batteries will automatically recharge if the monitor's AC power cord is plugged into a live power source. The front panel AC ON LED will illuminate when the monitor is connected to AC power. The front panel CHARGING LED will illuminate when the batteries are charging and will be OFF when the batteries are 90% charged.

Note: ***Neither the AC ON nor the CHARGING LED will be illuminated when the monitor operates on battery power alone.***

- ESCORT II+ charges fully depleted batteries to a 90% charge in 5 hours. Alternatively, the ESCORT II+ battery packs can be removed and replaced with fully charged battery packs.

- Batteries can be externally charged with ESCORT II+'s optional external Multiple Battery Charger (E2700-12). The Multiple Battery Charger can fully charge as many as three fully depleted batteries within three hours.

- When you turn the monitor ON and it is powered by battery alone, the ESCORT II+ displays one of the battery level messages listed in Table 2-2. The message will be displayed for thirty (30) seconds on the system message line.

Note: ***Battery cycle life (operating time) is dependent on battery usage and maintenance. To maximize battery cycle life, do the following:***

1. Operate the ESCORT II+ monitor with AC power whenever possible.
2. Always charge the batteries when the ESCORT II+ is not being used.
3. Immediately charge the batteries if the level reads LOW or VERY LOW.
4. If possible, alternate usage of batteries with an additional set. Ensure the alternate set always contains a full charge.
5. Replace batteries after two years of use.

Table 2-2: Battery Power Levels

MESSAGE	BATTERY LEVEL
MONITOR BAT HI	> 60% Charge
MONITOR BAT MID	20-60% Charge
MONITOR BAT LOW	< 20% Charge
BATTERY VERY LOW (Intermittent Alarm Tone Sounds)	Approximately 10 minutes of battery life remains

Battery Interface Board

The ESCORT II+ Model 20101 Battery Housing Assembly includes the Battery Interface Board (P/N 402720-0000). The Battery Interface Board provides the connection for battery power to enter the monitor, while also suppling a route for battery charging. A board layout and schematic are provided below and on the following page.

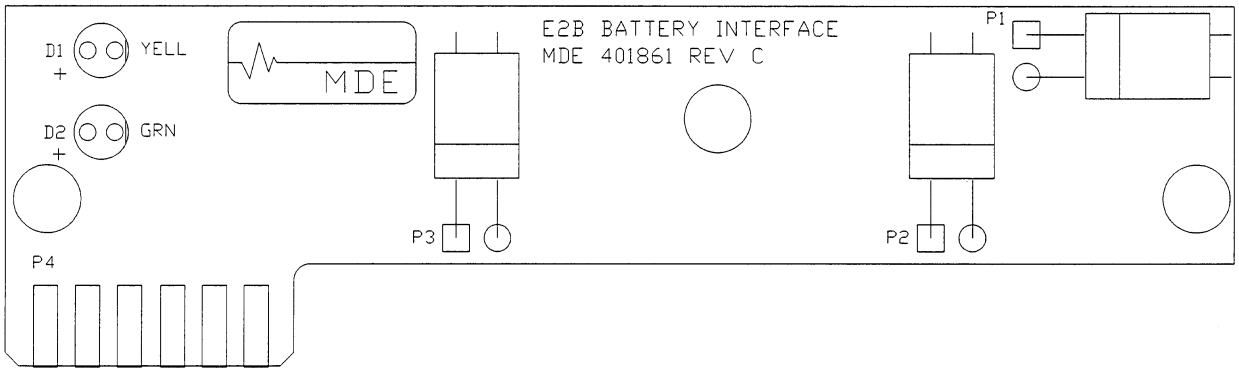


Figure 2-7: Battery Interface Board Layout

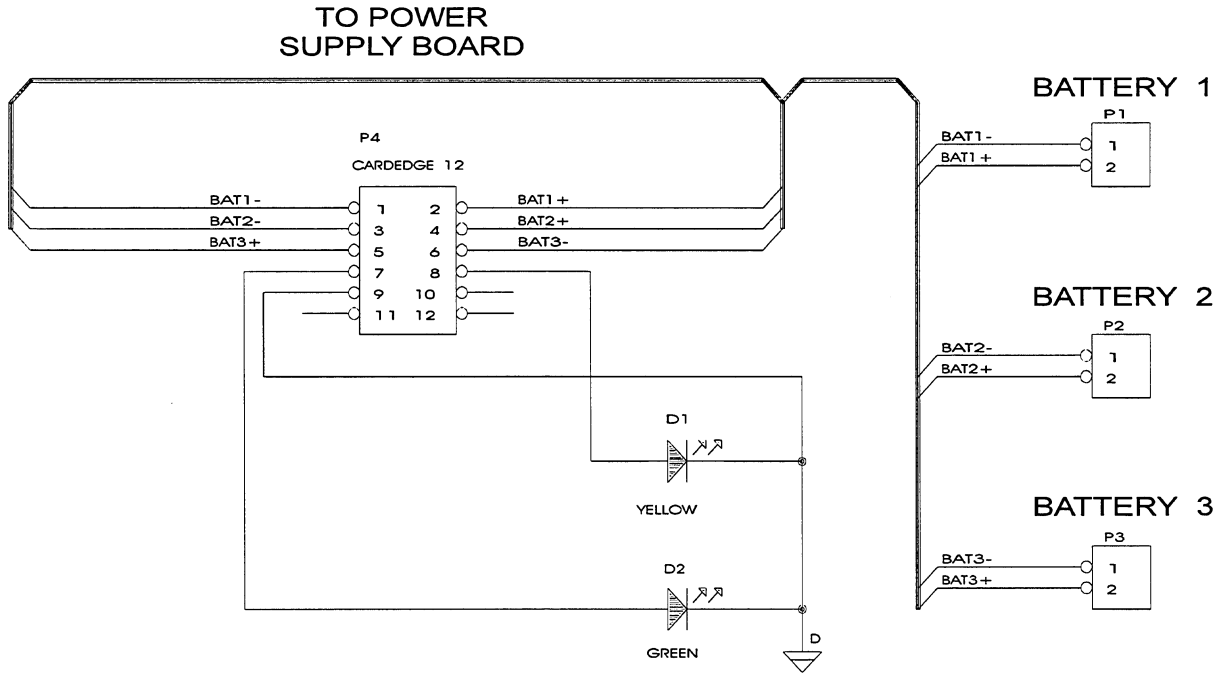


Figure 2-8: Battery Interface Board Schematic

External DC Connector

An auxiliary connector (center pin positive) labeled EXT DC 12-28V, 45 VA is located on the rear panel of the ESCORT II+. This allows connection to an external DC power source when AC power is not available.

WARNING: When using an external DC power source, the equipotential connector must be used as a protective ground terminal.

Turning on the Monitor

Take the following steps to turn on the monitor:

1. Make sure you have chosen your power source (AC, battery, or external DC), and have followed the guidelines and requirements in the appropriate section.
2. Press the ON key on the ESCORT II+'s front panel. You should see the ESCORT II+ display screen and hear two beeps.

Note: ***The first time the monitor is turned ON, after delivery from the factory, or whenever ALL default settings are set back to factory, a message will be displayed on the monitor screen indicating that all defaults are set to factory. To remove the display of the message, press the ALARM SETUP key.***

3 Power Supply Board

3 Power Supply Board

3.1 Overview

The ESCORT II+ Model 20101 Power Supply Board provides the flexibility to operate the ESCORT II+ via three separate input circuits. See Section 2.5, "Power Sources," for details. The Power Supply Board is used to generate the regulated DC voltages that are used throughout the monitor. Battery monitoring and charging are also accomplished on the Power Supply Board by use of a programmable microcontroller.

The available outputs are +5V, ±15V, +25V, and +30VDC.

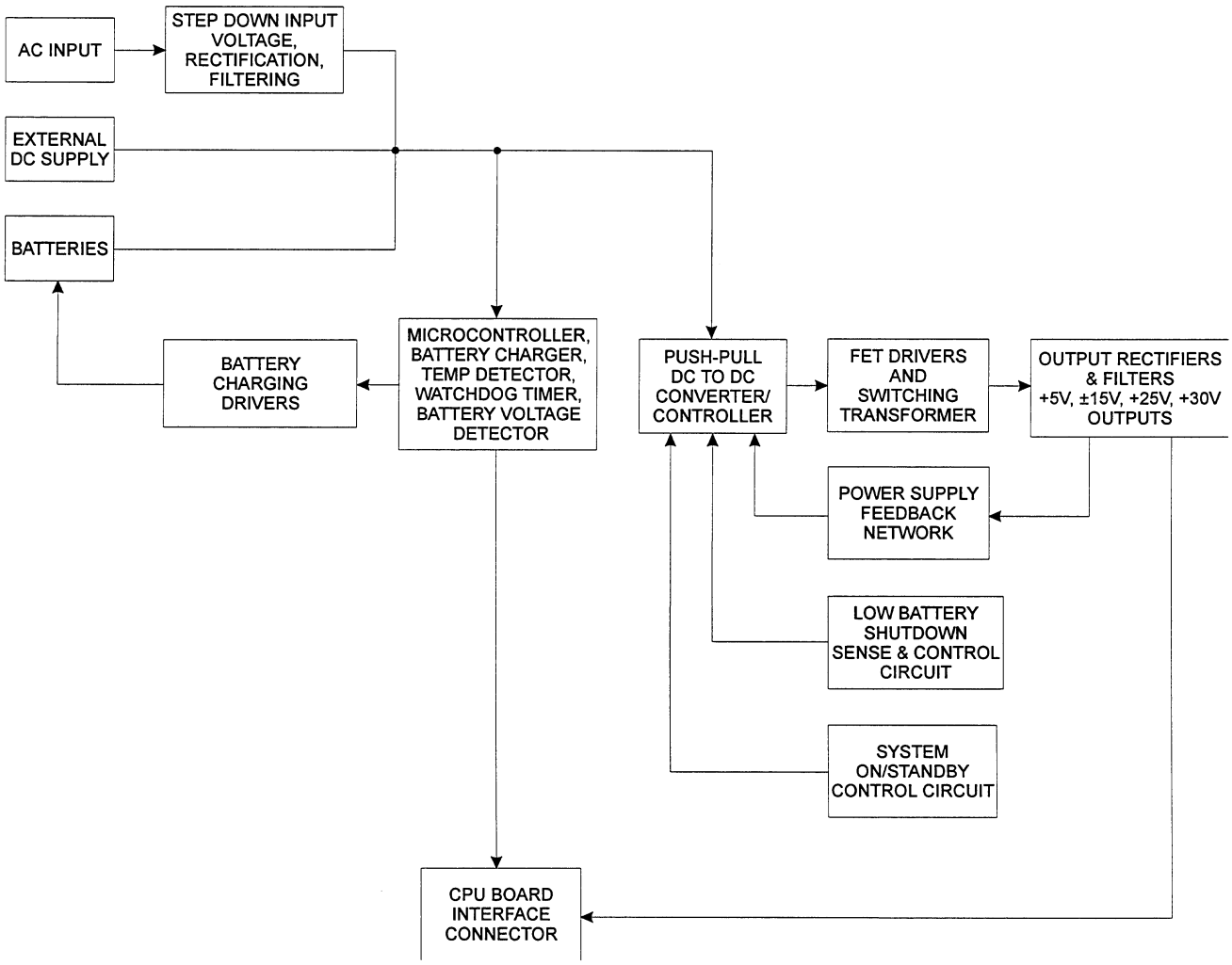


Figure 3-1: Model 20101 Power Supply Block Diagram

3.2 Input Circu

The ESCORT
external DC power

3.2.1 AC Power

When using A
transformer which
VAC. [VRAW] is
plugged into an AC
rectifier, BR1, pro
level. C2, C3, C4,
The [AC_DE
the line frequency.

3.2.2 Batteries

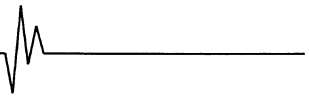
When the ESC
monitoring. Three
the batteries are wi
The battery current
[V+]. TH1 is a *Pos*
that will open the c
the high current so

3.2.3 External D

The external I
protection against
above. C8 is used a
Volts DC and is ra

3.3 Output DC

The Power Su
state relay, K1-5.
allowing the input
regulator, U12-3.
U5.

The Pulse Wi
frequency. C17, R
a 250 kHz synchro
once the power up
ECG and other circ
charges and provid
high power MOSF
diodes, D25 and D
voltages are transfe
+30V, +25V, +5V,

Diodes D16 a
pulsating DC to a s
Therefore, after the